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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/652,630	08/31/2000	David A. Cathey	100718-418 (MIC-76)	4333

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EXAMINER	
RAMSEY, KENNETH J	
ART UNIT	**PAPER NUMBER**
2879	

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/652,630	Applicant(s) CATHEY ET AL.
	Examiner Kenneth J. Ramsey	Art Unit 2879

-- Th MAILING DATE of this communication appears on th cover sheet with th correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-46 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 1-13,34 and 37-40 is/are allowed.

6)☒ Claim(s) 14-19,25,27-33,35,36 and 41-46 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7 and 8 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 14, 15, 17-19, 27-31, 33, 35-36, 41, 42 and 45 rejected under 35 U.S.C. 103(a) as being unpatentable over WO9000808 (or US 5,371,433) (BRODIE ET AL) in view of Horne et al US5371433 (Horne). As seen by Horne, column 1, lines 22-53, BRODIE ET AL discloses a field emission display comprising a anode plate having a fluorescent display and a cathode plate having field emitters, and spacer posts formed by photolithography (claim 17). BRODIE ET AL lacks a resistive coating or other stiff coating which covers the polyimide posts. Since the distance between the anode plate and cathode plate of BRODIE ET AL is 100 to 150 microns, the display is subject to flashover. Horne, column 1, lines 45-50 discloses that the prior art has applied a

resistive silicon oxide coating on the polyimide posts by vapor deposition to reduce the probability of flashover. Therefore, it would have been obvious for one of ordinary skill in the art to provide a silicon oxide coating to cover the polyimide posts of BRODIE ET AL to reduce the chance of flashover. As to claim 19, it is conventional to evacuate a field emission display to reduce flashover and improve the life of a display, see Horne column 4, lines 34-35. As to claim 18, the examiner takes Official notice that it is well known in the art to form cavities in the gate layer and insulator and to deposit cathode material within the cavities to form conical emitters. See e.g. figure 11 of Horne. As to claim 27, the examine takes Official notice that it is necessary to heat the spacer posts in the sealing step for field emission displays as seen by Horne, column 4, lines 34-35. As to claims 28 and 45, the examiner takes Official notice that it is well known to deposit silicon by vapor deposition in a vacuum and thereafter heat treat the silicon in a reactive atmosphere to form silicon oxide . Therefore, it would have been obvious to one of ordinary skill in the art to first coat silicon on the substrate and thereafter heat treat in a reactive atmosphere to prevent reaction of the polyimide with the reactive oxygen atmosphere.

Claims 16, 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over BRODIE ET AL and Horne as applied to claim 14 above, and further in view of Shinjo et al US 6,005,540 (Shinjo). The BRODIE ET AL and Horne references lack a teaching of forming a resistive silicon nitride coating in lieu of a silicon oxide coating. As shown by Shinjo, column 36, lines 58 to column 37, line 60, a resistive spacer coating can be forming on the spacers of a field emission display by chemical vapor deposition of

silicon in a nitrogen atmosphere or heat treating in a nitrogen atmosphere as opposed to using a oxygen containing atmosphere. Therefore, since silicon nitride is equivalent to the silicon oxide layer of Horne for the purpose of preventing flashover, it would have been obvious to one of ordinary skill in the art to employ silicon nitride for the silicon oxide coating of BRODIE ET AL as modified by Horne since nitrogen is relatively a safe and inexpensive gas.

Claims 25, 32, 44 and 46 are rejected under 35 USC 103 as being unpatentable over BRODIE ET AL in view of Horne as above applied to claims 14 and 28 further in view of Shibata et al. BRODIE ET AL as above modified in view of Horne still lacks a teaching of an aspect ratio of the height to diameter of 8 or more. Horne sought to increase the aspect ratio of BRODIE ET AL by providing multiple tiers of spacer columns by sequential layering of resist and photolithographic steps. It is not clear how but Horne alleged that a coating of a bleed off material such as silicon oxide was not required if a high enough aspect ratio could be obtained. Horne stated that the column diameter varied but was from 10 to 100 microns (column 2, lines 13-19) with a height of approximately 1mm. Shibata et al refers to BRODIE ET AL (corresponding US patent) and Horne and states at column 6, lines 31-36 that an aspect ratio of about 5-10 at most was reached by Horne and at column 7, lines 35-41 that the spacers of Horne built up a surface charge during use and that ultimately a discharge of the like occurred. Thus it would have been obvious for one of ordinary skill in the art to employ a resistive coating to bleed off the surface charges. Because the surface bleed of layer was a silicon oxide or like material, the buckling resistance is increased. Therefore, it would have

been obvious to employ aspect ratios of 8-10 in view of the teaching in Shibata et al, column 4, lines 2-7, that high aspect ratios were desired and that in Horne an aspect ratio of up to 10 could be obtained.

Allowable Subject Matter

Claims 1-13, 34 and 37-40 are allowed since the prior art does not teach or suggest a method wherein the photoresist columns are removed after forming the resistive coating layer thereover.

Claims 20-24 and 26 are objected to for depending upon a rejected claim but would be allowed if made self contained. Claims 20 and dependent claims are allowable because the prior art does not teach or suggest a method according to claim 14 wherein the silicon oxide is deposited on the top of the posts and on the top of the cathode. Claim 26 is allowed since the prior art does not teach or suggest the process of heating the posts prior to coating the posts with the coating material.

Directions for Responses

Any formal response to this communication should be directed to examiner Kenneth Ramsey, Art Unit 2879, and either
faxed to: 703-872-9318; or mailed to:

Assistant Commissioner For Patents
Washington, D.C. 20231

Technical inquiries concerning this communication should be directed to Kenneth J. Ramsey, (703) 308-2324 (voice), (703) 746-4832 (fax).

kjr
May 5, 2003

/Kenneth J. Ramsey/
Kenneth J. Ramsey
Primary Examiner